

Appendix G: Stream Habitat Conditions Report

Stream Habitat Conditions During Low Flow Conditions

Coal Creek, May Creek, Lower Cedar River, and Selected Tributaries

I-405 North Renton - August 2003

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Introduction

From the Cedar River in Renton to Coal Creek in Bellevue, there are few streams which cross I-405. During early August 2003, a field examination was done of these streams, both within the I-405 right-of-way, and downstream and upstream some distance. Habitat conditions were assessed, impacts of channel alterations made, and suggestions for restoration/mitigation opportunities made. From north to south, fish bearing streams are limited to Coal Creek (WRIA 08.0268) and selected tributaries, May Creek (08.0282) and selected tributaries, and the Cedar River (08.0299) and many of its tributaries. The majority of investigations involved these streams.

Remnants of three other streams were found crossing the right-of-way. The first is an unnamed independent tributary (08.0281) to Lake Washington adjacent to the SE Lake Wash. Blvd / I-405 interchange (exit 9) the next interchange south of the Coal Creek Parkway interchange. This creek no longer exists downstream of I-405. It ends at the flow control structure for a King County stormwater pond immediately south of the Park and Ride lot. The Park and Ride lot appears to have filled the former stream ravine. A City of Bellevue stormwater system map shows the creek to be piped straight downhill west to Lake Washington, although no clear evidence of this was seen in the field. The lake terminus of this stream *may* have been in Newcastle Beach Park. There is a remnant open water channel along the southern portion of this park, and wetlands with a flowing channel along the east boundary and entry road of this park. Habitat is very limited in the park; it is unknown whether any fish exist in these channels. Upstream of I-405 and the stormwater pond, the stream is wooded, deeply incised, and draining dense suburban housing.

A second remnant stream, “Gypsy Creek,” occurs immediately north of May Creek and north of the NE 44th St. overpass crossing of I-405 (exit 7). The stream is piped to Lake Washington from NE 44th St., under 405, under the railroad, and under an industrial log sorting yard. The only open section of this stream is one immediately downstream of the Denny’s, and another very short section between 405 and the railroad (WDFW K. Lakey, personal communication). There were once cutthroat trout in this stream remnant; they are assumed to be extinct. There is a narrow wetland riparian zone along the stream segment below Denny’s.

The last remnant stream is under 405 (approx. MP 5.68) at Sunset Blvd. Sunset Blvd is apparently built on top of where the stream channel was; the stream origin is unknown. It discharges into an open section for only a short distance. It is unknown how, or if, it discharges ultimately to Lake Washington, or to the Cedar River. There is, however, a 4 foot diameter concrete culvert on the right bank underneath the 405 Cedar River bridge dis-

charging significant flow (at August low flow) onto a riprap pile directly into the Cedar River. Nothing else concerning these remnant streams will be discussed in this report.

Coal Creek System

This system was walked on Aug 5, 2003, from the railroad at 405 upstream to approximately stream mile 4, just downstream of Lakemont Blvd.

Coal Creek Within I-405 Right-of-Way Exit 10

The stream condition is in very poor condition within the right-of-way. According to the 1975 Stream Catalog, the I-405 culvert is 475 feet long. It is an approximately 6x6 foot concrete box. The upstream end has a large flow control structure with trash rack attached, and 119th Ave. SE on top of it. It is assumed that the I-405 eastern right-of-way boundary is the fence line west of 119th, and that the I-405 culvert was extended upstream to accommodate the 119th construction. The culvert passes under the northbound (NB) off-ramp, under all lanes of I-405, and through part of the final flare of the southbound (SB) on-ramp. The culvert has off-set baffles along its base to aid upstream fish passage. This is a long, long, dark culvert. The stream channel at the outlet has been rebuilt with three log/riprap weirs within the last two years. These weirs appear stable and provide a modicum of pool habitat. It is not clear where the 405 right-of-way ends and the railroad right-of-way begins. I assume the creek channel has been placed approximately on the boundary line between 405 and a paved, fenced, two lane bike path on the shoulder of the SB on-ramp on the east stream bank, and the railroad fill and creek trestle on the west bank. Stream habitat is very poor through this length of open channel. The channel is essentially riprap lined within both 405 and railroad right-of-way. There is little riparian corridor; the vegetation is sparse deciduous trees and some shrubs and blackberries. There is no floodplain, except perhaps as a high flow flooded left bank wetland south at the culvert outlet. The streambed has cobble, riprap boulders, and some gravel not particularly of optimum size for spawning use. What little gravel there is discolored and is deeply embedded with fine sediments. There is a heavy coating of algae and sediment on all instream rock and gravel and the water leaves a foul odor on your hands. Only a few worms, and no mayflies, caddis, etc. were present. The water had a very odd murky appearance, with poor visibility. No fish of any kind were seen – considering the poor quality this was not surprising.

Widening 405 through this Coal Creek Parkway diamond interchange will be a tight squeeze for Coal Creek. Within existing right-of-way, there is no room upstream to extend the culvert. Downstream, the creek is in a deep open trench between the road fill and railroad fill. Immediately downstream of the railroad right-of-way begins the exclusive residential neighborhood of Newport Shores. A major redesign using stabilized earth construction, or vertical walls of some sort might significantly reduce the new footprint, but I doubt it would completely eliminate the further encroachment on the stream channel. The likely solution is to construct a new bridge crossing, offset north of the existing culvert alignment. The inlet and flood control feature would remain unchanged, and the new alignment would angle to and outlet somewhere near the existing railroad trestle. This will significantly shorten the stream length. There is a lot going on in this interchange – design to minimize stream impact will be a major challenge.

Forested Wetland - Immediately south of the Coal Creek 405 culvert outlet, there is a partially forested sliver of land, perhaps 3-5 acres. The sliver is between the 405 road fill slope and the railroad fill slope. There is evidence of standing water in the lowest part of this ground. The vegetation – cottonwood trees, some alder, and reed canary grass in more open portions, imply a forested wetland. It certainly provides wildlife habitat, but it has no corridor connection to the extensive riparian ravines further east. The City of Bellevue surface water map shows a stream, origin west of 119th Ave. and east of 118th Ave. SE, crossing under 405 and feeding into this wetland sliver. The wetland discharges whatever winter flow it may have immediately adjacent to the 405 Coal Creek culvert outfall. This stream appears to provide very limited opportunity for fish use. It may provide some flood storage for upslope origin flows, and possibly allowing very high flows from Coal Creek to back into it, but the connection is not good.

Restoration Opportunity – There is little opportunity within the I-405 right-of-way.

Coal Creek Downstream of I-405 right-of-way

The construction of the Montlake Cut and Lake Washington Ship Canal caused the lake surface of Lake Washington to drop approximately 8-10 feet. Prior to this event, it is likely that the old mouth of Coal Creek was somewhere in the vicinity of the railroad trestle/I-405. Extensive coal mining upstream, and wasting of huge amounts of mine tailings into the stream and canyon would have created a larger than normal delta into the lake as that material settled out in the nearshore. The drop in lake level would have exposed the delta, while the deposition continued. Now, the exclusive residential neighborhood of Newport Shores occupies the entire alluvial delta of Coal Creek. The stream channel has been moved, straightened, rocked, and now is totally lined by residential backyards from the railroad to the lake. Part of the delta has been dredged into a Lake Washington version of Venice, with navigation canals for resident's yachts. The stream channel is entirely inadequate to handle flood flows, even though parts of it were enlarged and re-armored in 1987-88. The stream bed is now at the same or higher elevation than the outfalls of the street stormwater drains. Channel deposition of fines still occurs, and it is likely that the mouth at the lake is dredged periodically. The shallow mouth (sheet flow) combined with a record low lake level caused a fish passage barrier during the drought summer/early fall of 1987. Flood control, and flood damage as a result of stormwater is a very important issue for those who live in Newport Shores. There are flood control structures and a sediment control pond at the I-405 culvert, another immediately upstream of Coal Creek Parkway, and a third sediment control pond immediately upstream of this latter structure, all to provide relief to these residents. Managing stormwater from the 405 expansion project will likely be of extreme interest to these homeowners.

Restoration Opportunity – None

Coal Creek Upstream of I-405 right-of-way

Immediately upstream of the 405 culvert inlet trash rack is an instream sediment detention pond, constructed in the late 1980s. It is dredged every couple years, but had not been this year. Water temperature was 58 degrees F.

A small stream, *Newport Creek*, enters the Coal Creek sediment pond immediately east of 119th Ave SE. A very large diameter force main sewer line crosses this stream upstream of a steep series of log weirs designed for fish passage over the sewer line. The stream has a coho and cutthroat spawning population. Juvenile passage over these weirs is not likely. Juveniles of both species were seen upstream to the end of survey. Stream temperature was 58 degrees F. The water and gravel quality is much better than in main-stem Coal Creek. The stream channel is in a deep wooded ravine (alder, vine maple, salmonberry) surrounded by private residential housing. Wildlife habitat exists, and is connected to the much larger riparian corridor along Coal Creek. The stream has been moved to the side of the ravine, and a buried sewer main/path parallels the stream. There are water, not sewer, seeps along the toe of slope. The stream has no floodplain, the bed being incised 3-5 feet deeper than original bed level. There is some exposed hardpan in the bed. There is actually large woody debris (LWD) in this channel, the gravel looks decent for an urban stream and is appropriate size for both trout and coho spawning, and there is ample shade from deciduous trees and brush. In an upper stream reach adjacent to a community swimming pool, extreme channel incision has led to construction of a high flow bypass pipe system. The pool had once been the source of highly chlorinated water discharged directly to the stream, leading to fish kills. This problem has apparently been fixed. While the bypass system, and the constructed stream over it are not without problems, the extreme incision, and side slope mass wasting is much diminished. The result of these past events is evident in the channel; there is an excess of gravel, and the percent fines is high.

Restoration Opportunity – Adding significant amounts of LWD will, over time, trap and sort the gravel, elevate the channel back up onto a floodplain in parts, slow flood flows, and improve fish habitat. This stream will not become a major fish producer.

119th Ave. SE pond upstream to Coal Creek Parkway - The majority of this long stream reach (approx. 1.2 miles) is now in public parkland. There is one apartment complex, and a series of 6-8 private right bank residences. All are associated with channel clearing, rip-rap armor (asphalt and concrete chunks also), and thin to nonexistent riparian shade along the right bank. There is a narrow sewer main crossing that is kept open and unvegetated. With these exceptions, the riparian condition is very good (60-80 percent cover). There is very little conifer component, most being cottonwood, alder, big-leaf maple, vine maple, blackberry, and salmonberry. Vegetation adjacent to residences is grass, and blackberry. Bird life is abundant. There are various manmade weirs in this section, all being functional and in reasonable repair, except one associated with a constructed over-wintering mitigation pond. This weir is failing around the left bank; its total demise is imminent. The over-wintering pond is sanded in at the mouth and perched. The water in it is foul, and it appears to provide no useful salmonid habitat. The weir adjacent to Coal Creek Parkway (vegetated soft gabion bank repair, built by WDFW circa 1988) is functional, and the bank is now stable and well vegetated. The instream structure of this 1.2 mile reach is surprisingly complex for an urban stream. There are LWD complexes, some pools in excess of 2 feet deep, a couple channel braids, and access to floodplain over some limited sections. In other sections, the bed has scoured 3-6 feet below original level. There are pools and riffles in relative abundance for an urban stream. There were two major stormwater outfalls into this stream section, one weighted down by a massive gabion basket structure on the left bank. The one minor right bank stream remnant, upstream of

an apartment building, provides minimal aquatic habitat. In Coal Creek, there is an abundance of gravel, of sizes appropriate for salmonid spawning.

The gravel here is badly fouled and embedded. The discoloration, sedimentation, and foul odors noted at 405 were even more pronounced approaching Coal Creek Parkway. I found no insect life, even snails or worms on gravel or cobbles, even in oxygenated riffle areas. The fuzzy sediment mix totally coated the gravel. When cobble was removed from the streambed, the underlying sediment was black. I wasn't certain of the origin but it may be either coal dust or a reducing anaerobic condition. Water visibility was poor, the water being very milky/murky (but not the "normal" bluish-white milky urban stream look). It had not rained for several days preceding the survey. Very few fish were seen.

Coal Creek Parkway to approx. RM 4 downstream of Lakemont Blvd. – Immediately upstream of the King County flood control structure at Coal Creek Parkway, a left bank "tributary" enters Coal Creek. This appeared to be the source of the discoloration, sedimentation, and other visible water quality problems noted downstream to the lake. This channel apparently originates from a long abandoned coal mine shaft (K. Paulsen, City of Bellevue, personal communication). Water temperature 58 degrees; mainstem Coal Creek upstream 61 degrees. Flow at 11:30 a.m. was approximately equal to that coming down the mainstem Coal Creek from upstream. Everything that the water touches in this tributary – rocks, sticks, leaves, sediment – is covered with a bright orange granular precipitate crust. There was no gravel in the lower 40 yards of this channel. The bed under the orange was black mud and sand. This orange precipitate continued downstream in the mainstem only a short distance, as a "plume" on the gravel. The discolored water, however, was evident well below I-405. Fish were conspicuously absent visually downstream of this tributary while upstream there were fish in nearly every pool to the end of the survey. The gravel in Coal Creek downstream of this tributary was coated with the previously described fuzzy sediment, and had no insect life. Upstream the gravel took on a much more normal appearance, even for an urban stream, and insect life became more evident as I went further upstream. The flow from this tributary originates from within the City of Newcastle jurisdiction. The mine discharge flow apparently fluctuates greatly. At times, this tributary may carry more water than the main stream. Fish sampling by the City of Bellevue has found far fewer juvenile fish downstream of this tributary than upstream, and fewer, and smaller macroinvertebrates (K. Paulsen, City of Bellevue, personal communication).

During the construction of the Coal Creek Parkway flood control structure in 1987/88, Coal Creek was diverted around the construction site, and fish captured and moved. This construction was immediately downstream of the junction with the "coal mine" tributary. There was no evidence at that time of discolored water, or fouled and discolored gravel. Both cutthroat and coho juveniles were abundant and healthy. Whatever has happened to this tributary seems to be relatively recent.

Clearly something is seriously amiss with this water source. Until source control can render this water more suitable for aquatic life, I would recommend against any expenditure for aquatic habitat enhancement downstream.

Upstream of the coal mine tributary, Coal Creek discharges from a large instream sediment removal sump/pond. It is large enough to affect water temperature; Downstream

water temperature was 63 degrees, upstream 61 degrees. From this point upstream to the end of survey, approximately 2 miles, fish (coho and cutthroat) were present in nearly every pool, insect life present but not abundant, gravel in many locations was suitable for spawning, and the ravine entirely wooded and in public park. There is a public path along sections of the main creek.

The first right bank tributary (08.0273) has had cutthroat and steelhead spawning recorded sporadically over its short reach accessible to fish. This stream originates in back yards, and in a ravine which is steep, very narrow, confined, and eroding. It has eroded down to bedrock, which forms the anadromous barrier. There is a persistent sewer gas smell just upstream from this tributary.

The bed of Coal Creek has numerous whole bricks and brick chunks downstream of the left bank tributary, which drains an old brick making plant. In this section large sculpins were first seen, as well as the first mayfly. Two larger salmonids, age 2+ cutthroat or steelhead, were seen in a deep boulder pool. The stream throughout has a riparian forest, mostly deciduous alder, maple, some cottonwood, and few conifer until the upstream canyon is reached. Sections where the stream has access to a floodplain showed evidence of large gravel movements. Elderberry and salmonberry colonized the gravel deposits.

The Stream Catalog notes “an impassible cascade and logjam occurs at RM 2.7, and a 10 foot impassible falls at RM 3.7”. These features were not found. There is certainly a canyon section, with large boulders, and exposed bedrock chutes. Upstream of the canyon the channel widens and gradient flattens; gravel is suitable for spawning for all species. The upper section near RM 4 has a long history of unstable banks and bed due to the “cinder mine.” Coal mine tailings were dumped into and along the creek, in beds exceeding 30 feet deep for a minimum of 1/3 mile of channel. The debris has slumped, caused landslides and debris flows, and the stream continues to cut down through the deposits. These deposits are still very evident along the banks, and well up the sides of the ravine 100 yards away from the stream. Chunks of coal from this debris are a significant component of the streambed through this section. In 1998 a Jobs for the Environment work crew placed log debris and boulders along sections of badly eroding bank to attempt to slow the rate of erosion. So far, this repair is working well, but we have not had a major flood to test it. Survey stopped at the upstream end of this Jobs for the Environment log work. Temperature at the upstream end of survey 59 degrees, air temperature 68 degrees.

Restoration opportunities – leave things be. The upper stream is in a long-term recovery mode.

Coal Creek Summary

Aquatic habitat within the I-405 right-of-way is very poor, and will not be greatly improved by anything we might do.

Fish passage through the I-405 culvert is about as good as it can get. This culvert should not be extended as part of the widening project. A new crossing should be built.

A major unresolved source of poor quality water was discovered entering Coal Creek just upstream of Coal Creek Parkway. This water profoundly affects aquatic habitat downstream down to and past I-405.

Newport Creek has possibilities, and need, for improvement, but it seems unlikely that significant gain can be made as mitigation for I-405 Coal Creek impacts.

There appears to be a significant forested riparian wetland partially within I-405 right-of-way immediately south of the Coal Creek culvert outfall.

Stormwater impacts are major in these watersheds. Flooding and damage are persistent in the Newport Shores neighborhood. There may be existing flood control structures, and retention / detention ponds scattered through the watershed that may be improved in function to accommodate the I-405 additions.

May Creek System

May Creek (08.0282) was walked on August 11, 2003, from the mouth at Lake Washington upstream to Coal Creek Parkway, approximately stream mile 3. Honeydew Creek (08.0285), the major left bank tributary, was walked from the old Devil's Elbow Road (NE 27th Street), now bicycle path, downstream to May Creek, approximately 1/3 mile. It is not recommended to walk (crawl) this section of Honeydew Creek ever again.

May Creek Within I-405 Right-of-Way Exit 7

Stream conditions within the I-405 right-of-way are fair. The stream crossing is a bridge hung about 20 feet above the stream. It is possible that this bridge was designed to be widened. It is piling supported, and the ends of the major cross members have rebar showing on the exposed ends. It may be possible to expand the bridge without totally destroying what is there. The stream under the bridge is in much better condition than Coal Creek is within the right-of-way. Everything within the right-of-way is a riprap armored bank, this is the easy way to tell you are within right-of-way. Armor stops both upstream and downstream outside the right-of-way. There is sufficient light penetration to support vegetation everywhere except immediately under the bridge. Both upstream and downstream, there are cottonwood trees, alder, willows, red-osier dogwood, salmonberry, ferns, and blackberries along both banks. Cottonwood trees have colonized the riprap over the last 40 years, and are growing up through it.

The channel under the bridge is squeezed too narrowly between the riprap banks, which are there to protect the piers from scour. If new piers continue upstream and downstream, they could be drilled shafts, eliminating the need for additional riprap, or repair of existing riprap. Expanding the width of this crossing will eliminate a number of 30-40 year old riparian trees now growing within the corridor. It is not likely they could be placed directly in the stream under the bridge due to the minimal cross section already there. If the bridge is replaced by a new bridge, then the channel cross-section should be expanded immediately under the bridge.

The upstream and downstream riprap that is already colonized by vegetation and trees should be left as is. Immediately downstream of the bridge, two rootwad/log structures have been placed in the channel along the left bank. Someone must have been worried they would not stay there as they are shackled, chained, and eye-bolted into large anchors. They look very secure. They have created some pool habitat. The water quality appears to be of good quality for an urban stream. The gravel was of sufficient size for spawning, and while somewhat embedded in mud and fines, was loose enough for fish to work. It is likely that immediately between the riprap banks under the bridge, any spawn-

ing which occurs would be subsequently scoured out during winter storm events. Downstream the channel widens and the riffles should be more stable. Gravel was not discolored and covered with sediment as it was at Coal Creek. Few fish were seen in this section, and few insects were present on the gravel.

Spawning and rearing of chinook, sockeye, coho salmon, and peamouth chub should be expected, at least sporadically, within the I-405 right-of-way. It is certainly worth keeping what habitat and vegetation there is in decent shape. Without great care during construction, this area will be trashed by the temporary equipment access bridges, staging of materials, and concrete pours/spills into the stream which very often lead to fish kills. The Specials for this bridge work should be very fussy, and close inspection will be required.

May Creek Downstream of I-405 Right-of-Way

From Lake Washington to the I-405 bridge, May Creek is in fair condition as an aquatic and riparian resource. At the lake, the stream has been moved to the side of its historic delta discharge point, and the old sawmill built in its place. The mouth at the lake appears to be dredged regularly. A longtime mill landscape maintenance employee described chinook and sockeye spawning along the mill site, and schools of peamouth chub spawning aggregations. Gravel is of sufficient size for spawning, and although embedded, probably provides successful incubation. There is little wood of any sort in the channel. The mill has been inactive for many years. There are plans for conversion into some sort of residential development. The outside of every channel bend is armored with rock or concrete rubble. There is minimal riparian vegetation, but the majority of the channel receives shade during at least morning hours. The channel is encroached by lawn and pavement, but active industrial effluent and other disturbance are now absent. Water temperature at the first mill bridge upstream from the lake was 59 degrees at 7 a.m. Fish were present.

Upstream of the mill, there is a railroad trestle and the Lake Washington Boulevard bridge. Between these two bridges is a US Geological Survey (USGS) concrete weir stream gauging site. It was in use by the USGS at least as late as 1988. It provides a very deep scour pool, shaded by surrounding shrubs and trees. Beginning at these bridges and upstream to I-405, the stream is in remarkably good condition considering the channel alterations of the past. This runs for approximately 1/8 mile behind an apparently defunct home manufacturing site. The only activity on this site appears to be storage of large recreational vehicles. The stream has a riparian canopy, however narrow, along most of its length. The “forest” is cottonwood, alder, and maple, being much wider on the left bank (south). LWD is largely absent, but there are some natural looking log/stick jams that are creating pools. The channel is very straight, undoubtedly ditched and straightened in the past. The banks are not armored. The stream has access to a floodplain in places, primarily on the left bank. There appears to be a low berm/dike under a mass of blackberries adjacent to the abandoned home manufacturing site buildings. The gravel is of sufficient size for spawning use, and while embedded with mud and fines, is loose. Gravel is not scummy, and looks like it should for an urbanizing stream. Fish are scarce but present.

Restoration Opportunity – The area between the lake and 405 is a very likely candidate for stream and riparian enhancement/restoration. There may be opportunity for wetland creation associated with channel manipulation, particularly behind the abandoned home

manufacturing site. LWD could be added into the entire section from 405 to Lake Washington Boulevard without causing undue risk to surrounding properties. No structures are immediately adjacent and at risk of flooding. On the sawmill site, much of the channel is too narrow for the flows, and significant channel enlarging and some lengthening is called for prior to adding wood or doing major riparian planting. Chinook, sockeye, and peamouth chub are known to spawn throughout this section. The abandoned home manufacturing site might be a likely candidate for a stormwater treatment site for 405 flows. A very long section of 405 drains to this low spot, both north and south. *Perhaps* it may be allowed to dump the 405 stormwater directly into Lake Washington without detention, but the treatment of the pollutants will require a considerable piece of ground by itself.

May Creek Upstream of I-405 Right-of-Way

The majority of May Creek upstream from I-405 to Coal Creek Parkway, approximately 2.5 miles, is a forested ravine which narrows going upstream from 405. It is a forested ravine somewhat like the Coal Creek valley. The majority of this area is in King County's May Creek Park. However, the downstream end roughly paralleling Jones Road is in mixed public and private ownership. Going up May Creek, the stream intersects Jones Road no more than 100 yards upstream of 405. There is a flowing Type 4 stream that enters May Creek from a perched culvert, originating in what appears to be a drained and converted, partially filled, wetland. The property is mixed open grass and blackberries, with cottonwood and alder fringing woods. The property is for sale. It may make a wetland creation mitigation site with associated stream. It is too far from 405 to get stormwater for a treatment site.

Upstream of this sharp corner at Jones Road, the stream and 405 get closer together. There is a section perhaps 1000 feet long that has clearly been channelized, likely in part due to construction of 405. The stream takes an abrupt angle change away from 405 at the downstream end of this section; the sharp bank closer to 405 is heavily rock-armored. Upstream the channel is 20 feet or less from the upslope right-of-way fence. The highway is close to the stream, up a very steep but now forested slope. Building a new northbound lane on the top of this steep partially filled slope will require specialized reinforced earth, or sheet pile, or concrete retaining walls. The existing slope is likely to have been partially side cast, the waste traveling down this long slope. Standard earth fill slopes are not recommended along this reach, probably not even possible.

As this straight stretch continues upstream, it becomes squeezed between riprap banks on both sides. The DOT side, and the opposite bank with private residence and old pasture have the same size and kind of riprap. It seems likely that both banks were rocked at the same time, most likely by DOT. There is a private well house and hose on the stream-bank. The water source may be a seep that comes out from under the 405 slope, or it could just be a shallow sand point next to the channel. The stream is very much narrowed through this reach, the bed has riprap chunks and cobble. There is too much scour for much gravel to stay. Caddis were found on some cobble in this very well oxygenated section.

At the upstream end of the riprap section, the stream again takes an abrupt angle away from 405 and heads SE upstream. What appears to have happened is that May Creek has been shortened and straightened through the reach. The original stream must have been

eroding into the toe of the road slope, or there was fear of scour continuing and undermining the road way up the slope. The stream was moved to just outside the right-of-way fence, but not further to prevent encroaching on private land (probably productive pasture 40 years ago). Over the intervening years, some deciduous trees, mostly brush, have grown up along this channel. The hill up-slope to 405 is now forested. Photos circa 1965 should clearly show this channel straightening.

Restoration Opportunity – There is good reason to look at this channelized reach as a potential mitigation site. All species of anadromous salmonids, including chinook, have access, it adjoins 405, and it was very likely caused by construction of 405. Channel re-configuration and LWD addition should be possible without undue risk to surrounding properties. Purchase, or conservation easement of the right bank private property would open up the possibilities for this stream reach, and optimize the likelihood of successful work.

Very close to the sharp bend where Jones Road turns into NE 31st St., close to a red house, a badly designed stormwater outfall enters the stream on the left bank. The corrugated metal pipe drops 10 feet into the stream, the bank being badly eroded back. At least 50 yards of dirt and bank material have entered the creek over the years.

Restoration Opportunity – This outfall needs serious work at its source to minimize flows, and a much more stable and less damaging discharge to the stream. There may be retrofit possibilities on stormwater storage volume at its source. The subdivisions on the hills (Renton) above the valley are older, and undoubtedly built without appropriate stormwater controls.

May Creek and the valley road (now NE 31st St.) takes a turn east at approximately stream mile 1. Just beyond this, the stream is entirely within May Creek Park. Here the riparian condition is fair; there are many alder, cottonwood, and shrub species along the stream. There is little wood in the channel. It is tempting to look at this perhaps 1/8 mile reach prior to the private homes upstream as an area where LWD could be added. However, the road is close to the stream, the road has little vertical relief above the stream in some places, and local flooding may be a concern for upstream residents. If road closure from flooding is not an issue, then this is another place where LWD placement could be done, on public land, with little risk to adjoining lands. Under-planting the largely deciduous riparian zone with conifers could be pursued regardless of road flood risk. There is a serious problem with the riparian zone being taken over by the highly invasive exotic plant Japanese knotweed. This plant was brought in as an ornamental, and is taking over the riparian world. The source of this plant appears to be the private residences just upstream. Control of this plant is required if any riparian planting project is undertaken.

At the end of NE 31st St., private homes (3-5) and stream-side yards end at an old home-made steel stringer bridge. There are no other stream side residences, or other major encroachment except for a power line crossing, from this bridge upstream to Coal Creek Parkway (about 1.5 miles). The largely deciduous forest is largely undisturbed and in second growth conditions. There are some scattered conifers, becoming more frequent and close enough to eventually enter the stream upstream of the powerline crossing. Throughout this entire 1.5 mile stream section, conifer and maple LWD has been placed by helicopter, not anchored, in the stream this summer. Placement was concentrated in

areas of more open canopy along the stream, for equipment, operator, and ground crew safety. I met a crew contracted to King County that was labeling all the wood pieces/complexes. Through this reach, the channel is much more diverse than downstream. There are steeper sections, some sections incised below the floodplain, some channel braids, and other major parts with full access to the floodplain. The LWD should cause even more interaction with the floodplain. It looks like the choice of this stream reach for LWD additions was a very good idea. A number of small tributaries enter the ravine, each with an alluvial area and access by fish. Only Honey Creek had surface flow into this section of May Creek during the survey. There is no conflicting land use or infrastructure that would interfere with the stream doing what streams do. Juvenile coho salmon, and trout were present, but not abundant. Temperature at the first powerline crossing was 63 degrees, air temp 78. Insects on gravel included caddis, but few mayflies, and no stoneflies. The only riprap was at the powerline crossing; it serves no purpose, it's just there. Dirt bikes have heavy use of the powerline right-of-way and appear to cross the stream, or have access to it. In the mid 1980s, there were persistent rumors of kids on dirt bikes chasing chinook around in May Creek – this may have been an access point. The kids today are probably the children of those bikers. Gravel throughout this reach is sufficient and proper size to support spawning. The gravel is not badly embedded, and is normal color (not covered by petroleum products) and not scummy with dense algae. Upstream approaching Coal Creek Parkway, hardpan becomes exposed in the stream bed, and the bed and banks begin to exhibit signs of scour. This becomes increasing pronounced at and upstream of the Coal Creek Parkway bridge. Decades of channelization, and draining of wetland storage upstream in the upper May Creek valley, may have led to the scour impacts this far downstream. Channel confinement, residential encroachment, and removal of riparian trees and vegetation upstream of the Coal Creek Parkway bridge are also likely contributors. The gradient flattens upstream of the bridge, but the habitat becomes poorer due to the human impact.

All is not well in this long 1.5 mile section. There is an exceptional mud source which enters May Creek immediately downstream (approximately 60 yards) of the mouth of Honeydew Creek. This muddies the stream for perhaps one quarter mile downstream, and has spread a layer of mud over much of the gravel. Its source is unknown. It is likely that it crosses what is left of the west end of Devil's Elbow Road (NE 27th St.), perhaps in a pipe running down the hill.

Restoration Opportunity Whatever the source of this large quantity of muck should be investigated, and fixed. Considering the age of the up-slope subdivisions, it may be possible to provide significant stormwater treatment, storage, and a new stable outlet to the stream to compensate for some of the 405 stormwater impacts.

May Valley agricultural area, and upper tributaries – There were no areas surveyed on foot. Much of this valley looks as it did in the mid 1980s. Some parts are better and some about the same – poor. There had been a drainage district when this valley was much more intensively farmed. This district was responsible for keeping May Creek ditched, the various lateral drainage ditches cleaned, and the farmed/pastured wetlands drained, but appears to have gone defunct. Much of the valley is in a state of drainage disrepair, some wetlands are becoming wet again, many pastures and fields are fallow and going back to nature. Other areas are farmed and grazed, and kept beat down.

There has been a fencing and revegetation effort since the 1980s. The riparian area is very narrow where it now exists, and the channel is still straight and with little habitat. This seems a very likely valley to find excellent wetland restoration projects, and natural flood storage possibilities, though there may be local opposition. Drainage and flooding are very important issues to May Valley residents. Close coordination with the County watershed steward, and the King Conservation District is absolutely essential to getting good restoration work done in the valley.

There are at least 3 upper valley tributaries which have coho, cuts, and steelhead spawning and rearing. One roughly parallels, and crosses under, SR 900, the Coalfield Road between Issaquah and Renton. The basin plan may identify beneficial work that may be located within the SR 900 right-of-way.

Honeydew Creek - The creek name is said to be derived from the sewer line that is laid for some distance in the stream bed (or where the creek was before being moved aside). In the early 1980s, high stream flows caused scour and slumps; the sewer main was exposed and ruptured more than once. A section of stream upstream of Devils Elbow Road was rebuilt, and the culvert replaced under the road. The watershed upstream is in dense residential use. Things look much better now than in 1988. The banks and bed are stable, and raw and failing slopes have become healed by vegetation. The stream ravine now has a fairly complete canopy of deciduous trees and shrubs. Cutthroat trout were seen in the reconstructed channel. Stream temperature was 60 degrees. Devils Elbow Road had been a local garbage dumping ground. The original road alignment and stream crossing blew out over 30 years ago. The reconstructed road alignment had slumped east of the culvert crossing and dumped down the stream. The sliver of road left is still cracked and failing. The result of these failures running out into the stream is that old garbage, metal, glass, concrete, and sediment are now common in the stream bed. The slumps and run-outs have re-vegetated to blackberries which cover some of the garbage that hasn't yet gotten to the creek. What isn't blackberries is vine maple. The stream bed gravel is loose, but is moving through in waves with lots of mixed sand. The alluvial area near May Creek appears fairly stable, and should provide some spawning, and rearing habitat for salmonids.

Restoration Opportunity - Leave the stream channel alone – it is in a recovery mode. It could be useful to remove the cracked and failing side-cast asphalt road section before it too slumps into the creek. A bike/jogging path would need reconstruction to replace the road sliver. It might be useful to coordinate with the City of Renton concerning retrofit of watershed stormwater facilities. Better control of stormwater would be a long-term benefit to this stream.

May Creek Summary

Stream and riparian habitat within the I-405 right-of-way is decent for an urban creek, except immediately under the bridge where the channel is riprap lined and confined.

Spawning of chinook, sockeye, peamouth chub, and coho salmon should be expected, sporadically, within the right-of-way. During a dry fall, it may not be possible for chinook and sockeye to even enter the stream or ascend to this location.

Widening the bridge will result in removal of a number of riparian and upslope trees.

Widening I-405 up the hill south of the May Creek bridge will be expensive due to the steep slope that the roadway overhangs. May Creek is at the immediate toe of slope. Specialized retaining wall construction is likely necessary on the fill slope.

It is likely that May Creek upstream of the bridge was filled and moved away from the right-of-way during the 1960s construction of I-405. The channelized stream section is a reasonable, and accessible, candidate for channel restoration.

In-channel, and riparian planting improvements are recommended for the area downstream of I-405 to Lake Washington.

Upper May Creek valley is no longer in intensive agricultural production, and may provide candidate sites for flood storage, and wetland creation / re-creation. Local opposition may preclude this.

Lower Cedar River, and Rock Creek, Taylor Creek, and Petersen Creek

On August 12, 2003, the lower Cedar River was walked from Lake Washington upstream to River Mile 3, a trestle over the river adjacent to a King County Park. Nearly the entire length was walked on a paved recreational trail.

Cedar River Within I-405 Right-of-Way exit 4AB

It appears that the entire right-of-way is covered by the I-405 bridge. Under the I-405 bridge the pedestrian trail crosses the river on a very nice concrete footbridge. Little light penetrates under either bridge. Some blackberries survive. The channel is riprap lined, and has multiple stormwater outfalls entering the river. One left bank outfall from 405 discharges under the river surface at winter flows, and has scoured a slot in the river bed. On the survey day, there was a right bank 3-4 foot diameter concrete culvert with significant discharge. It had not rained for weeks, so this is a possible piped stream outlet, perhaps from the Sunset interchange. The gravel under the bridge is doubtless used for spawning by both chinook and sockeye. There is much better spawning upstream. Limited rearing is possible in this reach due to poor habitat conditions. The lights under the bridge are hooded, presumably with the intent to limit the impact of on-water lighting, and the resultant predation, during salmon smolt out-migration. There is probably little ability to improve the habitat within right-of-way. The channel capacity appears limited, and the proximity of so many other conflicting structures and uses makes significant improvement unlikely. Providing flood terraces is not possible due to encroachment of road and bridge piers. Stormwater quality control would be a definite improvement.

Cedar River Downstream of I-405 right-of-way

The channel is entirely manmade all the way to the lake. The Cedar was diverted out of the Black River/Green River system. The lower Cedar is completely lined with a variety of riprap, concrete, gabion baskets and brick walkway, more riprap, steel pile and timber and concrete panels, etc. Nearer the lake, the Renton Airport forms the entire left bank, and various Boeing plants form the right bank. There is a narrow public park on the right bank, the path being built on a cleverly disguised Corps of Engineers flood control levee. This levee project was just rebuilt in the last few years. Any modification of either bank is unlikely in the near term. Renton Airport occasionally floods; the levee project is

probably designed to push the flood waters to the airport side, and away from the Boeing plant side. There is no significant excess channel capacity in the lower Cedar. Additions of significant amounts of LWD, now completely missing, should not be expected.

Restoration Opportunity – This area is devoted to flood control, and public recreation and footpath. This is not a good place to look for mitigation work, or restoration. Riparian restoration is unlikely, and would be cosmetic only unless there is future redevelopment of large industrial plant site along the river. If that should occur, then channel restoration may be possible, however remote.

Cedar River Upstream of I-405 right-of-way

From the I-405 bridge upstream to RM 3, there is only limited opportunity for improvement. The left bank upstream for about a mile was the site of a large sand and gravel operation, and a brick manufacturing plant. Much of the riverbank has evidence of brick waste, seemingly pushed over the side, perhaps for bank protection. Cottonwood, alder, blackberries and brush have colonized this bank well. The right bank is entirely armored even further upstream. A concrete manufacturer has armored their entire site, and raised it above flood level. The bank has been covered with end-dumped concrete slurry, and now has a veneer of large concrete facing blocks. There has been some preliminary discussion of the City of Renton redeveloping this site for their own use. If this should occur, then removing the concrete completely, and sculpturing the bank back could be possible. Without added river cross section, any addition of wood may cause flooding as a backwater effect. This possibility, or at least the perception that this could happen, will probably preclude any useful amounts of wood to be added in this section of river.

Restoration Opportunity – At King County's Riverview Park, there may be some limited possibility for improvement. Two unnamed left bank tributaries enter the river, the furthest d/s is sometimes called Ginger Creek. The upstream creek comes out of a ravine and through a wetland perched and trapped behind the old railroad grade, now bicycle path. The wetland flows under the path, and disappears into a sea of blackberries across the left bank floodplain of the river. This site had been an old farm. It may be possible to clear the blackberries and brush, "unchannelize" the stream, and create wetlands associated with the river floodplain. Riparian revegetation should also be considered, adding to the cottonwood stand now choked with an understory of blackberry and knotweed. This stream was not surveyed to its mouth at the river.

Cedar River and tributaries restoration literature - There has been a lot of published work by many groups and governments. I have reviewed the following and found much useful information, and many listings of potential restoration projects:

- Lower Cedar River Basin and Nonpoint Pollution Action Plan. Adopted by King County Council 1997
- Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Near-Term Action Agenda for Salmon Habitat Conservation. 2002.
- WRIA 8 EDT Habitat Assessment Model DRAFT Analytical results for the Cedar River Watershed, 2003.

The lower Cedar tributaries, including Maplewood Creek, Molasses Creek, and Madsen Creek, are highly urbanized, and within the Urban Growth Boundary of Renton. Their water quality and habitat was severely damaged 20 years ago, and no remarkable improvement has occurred. Nor is it likely within the time frame of the I-405 project, no matter how much mitigation effort may be applied. There may be opportunities in these urban watersheds to greatly improve various stormwater facilities, gaining water storage and treatment improvements. It does not seem that any tributary in the lower 10 miles of the Cedar may be worth a great deal of effort to improve for habitat purposes, due to the impacts of anticipated upslope urbanization.

There are various river floodplain actions perhaps useful to pursue. A number of levee removal – pullback projects are listed, some much further upriver. These projects are very expensive, controversial, affect many homes, and are likely to result in lawsuits as a result of flooding or property damage after the levee work is complete. However, there is an off-channel excavation/enhancement project proposed by the Mid-Sound Fisheries Enhancement Group. It is located immediately east of the Maplewood Golf Course, on the right bank of the river. I have a copy of the preliminary design report, prepared as a class project at the UW Center for Streamside Studies. It looks promising, but I have not evaluated the site. There is no apparent adjoining property or structures that would be at risk from doing work at the site.

It may be more appropriate to put restoration effort into streams further upstream where water quality is still decent, streams that are outside the Urban Growth areas and so likely to stay rural for the foreseeable future. Three streams in the Maple Valley area are good candidates, lower Rock Creek (08.0338), Taylor Creek (Downs Creek in the Stream Catalog) (08.320), and Peterson Creek (08.0328). These streams have documented chinook spawning and rearing. Watershed characteristics, and restoration actions are well described in the above literature. These streams were partially surveyed on August 13.

Lower Rock Creek

At the old railroad trestle near the mouth, a wooden flume provided very poor fish passage for many years. It is finally being replaced this summer. The stream was surveyed upstream from the trestle for approximately half a mile. The majority of this watershed is in public ownership. Water temperature was 52 degrees. This section of channel looks much as it did in 1987. This is a wonderful stream and riparian resource. The stream is in a fully wooded ravine with abundant LWD of large size. The riparian canopy is mixed deciduous and large second growth conifer. Bed and banks are very stable. This stream was a pleasure to walk, after the last few streams surveyed. At the Seattle Aqueduct crossing, the culverts are old, and inadequate to pass all flow and debris. The main 4 foot by 4 foot concrete box has baffles in the bottom to aid fish passage.

Oddities were noted during the survey. There was a surprisingly low density of juvenile salmonids seen, considering the high quality rearing habitat available. Viewing conditions were excellent; this is clear non-tannin colored water, so fish would not be missed. Aquatic insects include mayflies and caddis of various species, but they were not distributed on the gravel as expected, only being found in the channel thalweg. Moss was growing well down on most cobble, under the water level during the early morning survey. The moss would normally not be so far under water, being scoured off during higher

flows, and surviving only on the upper side of cobbles protruding out of the stream. It is apparent that a long time problem is still present. First, a headwater section of Rock Creek has been diverted into the Green River system. This would result in a lower base-flow. The bigger problem is due to the City of Kent wellfield upstream. Their municipal water supply wells are in close hydraulic continuity with Rock Creek. Water levels used to fluctuate widely over the course of a day. Stream flows would be low throughout much of the day when pumping demand was high. This was particularly noticeable during summer and fall months. At night, when pumping demand dropped off, the stream flows would increase again. These widely fluctuating flows appear to be seriously affecting juvenile salmonid rearing, insect production, and the flora of the stream.

Restoration Opportunity – Replace the Seattle Aqueduct culverts with a more suitable structure able to pass wood debris. Negotiate a return of the headwater flow to this stream. The City of Kent pumping issues are beyond the scope of potential 405 work.

Taylor Creek

A windshield, not walking, survey, was done. The Taylor Creek watershed is rural, with many small grazing operations. There is a need for fencing and riparian revegetation in many locations. In the upper watershed east of SR 18, there are a number of county road culvert crossings that are partial barriers to fish passage. This upper watershed is a coho, cutthroat, possibly steelhead area. Water temperature 59 degrees, air temp 72 degrees. Culverts to be replaced include 236th Ave. SE, SE 208th St., and 258th Ave. SE. It appears the largest problem for fish passage is the SR 18 culvert. It is passable for adults at some flows, but is a barrier to juveniles. Perhaps it will be replaced as part of the SR 18 improvement project. It is an ancient 4x5 foot concrete box with baffles, and is very long.

Restoration Opportunity – There is a private, homemade driveway culvert immediately d/s of the SR 18 culvert outlet, at SE 215th St. The culvert is failing, the fill has settled, the road surface is cracked and slumped. The entire structure is in danger of failing during the next flood event. When, not if, it fails, the debris it would dump into the stream would not be beneficial.

Downstream along Maxwell Road, the stream has been straightened, has 90 degree corners, and has been maintained by periodic dredging. There are existing flooding problems, the channel has many sections choked with canary grass and cattails, and stock is in the stream in some locations. The stream forms a road-side ditch for approximately one half mile. There is some brush and willow riparian cover, in sections of this stream. This is an agricultural ditch, flood channel now partially overgrown and not dredged for awhile. There is a need to significantly improve the stream capacity and habitat. There are numerous property owners along this ditched stream section, and doing any major improvement will be slow in coming. A number of potential projects are noted for Taylor Creek.

Restoration Opportunity - There have been some past attempts to convert the lush stands of knotweed into better habitat downstream of the last county bridge over Taylor Creek. It might be useful to work with such receptive landowners and place LWD in the channel well downstream of the flood-prone ditch, in the area of documented chinook spawning.

Peterson Creek

The lower 1/3 mile of Peterson Creek was walked, and the area around Peterson Pond. Lower Peterson Creek is in a deep narrow ravine, fully wooded, with numerous logs and jams. There are some old growth logs, including one enormous one, spanning the stream. There are more conifer logs and debris in the stream than is growing on the banks or up the slopes. This lower floodplain and canyon is the area most likely used by chinook. Entry from the river is not possible at these low flows. Chinook may not use Peterson Creek during a drought autumn.

The upper part of the Peterson Creek watershed is a land of wetlands and lakes/ponds. The stream is tannin color, and water temperatures warm (72 degrees at Pete Pond outlet) due to solar heating in the lakes. Peterson Pond appears to have been made much smaller. There may be opportunity to reverse this. At the outlet there is an ecology block control structure/weir just below the aqueduct pipeline road. Approximately 20 years ago, Peterson Creek downstream had been dredged at least 2-4 feet deeper than the original bed elevation. Spoils piles exist on both banks at least 20 feet back from the stream. This was a big through-cut, made by large machinery. The cut continued at least 100 yards downstream. Freshwater mussels are growing in this channel; shell samples were taken. There have been very recent additions of LWD into this dredged channel. The alders colonizing the spoils piles are approximately 20 years old. This dredging operation should show clearly on 1980-85 air photos.

Peterson Creek just upstream at the lake inlet had been in a long culvert until the early 1980s. Seattle Water Department had kept the stream in a culvert for many years previous. This section between 196th Ave. SE and Peterson Pond has now grown back to brush. It forms the road-side ditch of Petrovitsky Road. South of Petrovitsky, the Seattle Aqueduct is laid on large concrete pads across an extensive wetland contiguous with Peterson Pond prior to the building of Petrovitsky Road. My guess is that Seattle Water Department dredged the outlet of Peterson Pond, perhaps more than once, to significantly lower the elevation of Peterson Pond. This would give them equipment access, on pads, across the old lake shore of Peterson Pond. Lowering the lake would also prevent the lake level from rising up high enough to float the water main off its foundations.

Restoration Opportunity – It may be possible to undo some if not all of the draining of Peterson Pond. If you could put 3-4 feet of water back on Peterson Pond, you would get many acres of added wetland, and many acre-feet of storage. Fish and wildlife/waterfowl habitat would benefit. Raising the lake level may require raising a section of Petrovitsky Road, and the intersection at 196th Ave. SE. The cross-wetland section of Petrovitsky may be built on cedar puncheon; if so it may still be good. It may require additional weighting of the pipeline to prevent floatation. There may be other, easier wetlands to restore in this watershed. Upstream, the residential lake elevations are probably set by court order and homeowners associations, so added storage is not likely.

